SHOCK ABSORBENT WING SUSPENSION FOR GLIDERS

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An imaginative feature in sailplane design has been reported in a recent Russian book on gliders.* An experimental ship has been constructed in the USSR with a wing suspension buffered by a pneumatic shock absorber, as shown schematically in Fig. 1. With this arrangement either straight or mazy flight. Even with the pressure in the suspension reduced to permit full deflection (8 feet displacement of the wing tips!) no appreciable difference in controlling the plane was detected.

The highlight of the report is the statement, unfortunately laconic, that

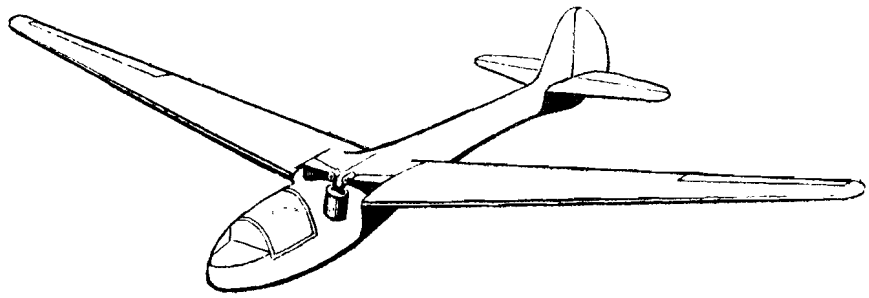

Fig.1. Soviet experimental sailplane "Kashuk," designed by A. Manotskov. Shock absorbent wing suspension reduces stress surges, makes for a smooth ride and improves aerodynamics properties of the glider.

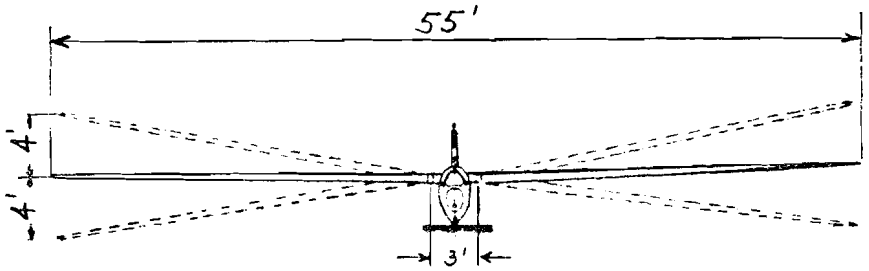

Fig. 2. A wing flutter of up to 8 feet wing tip displacement was found not to affect adversely the control of the plane, but gave indication of recovering some of the energy from turbulent air, thus optimizing the performance of the sail plane.

it is possible to fly with an exaggerated wing flutter ($\pm 6°$), or to fix the wings at any dihedral angle while in flight (see Fig. 2).

From the observation of the manometer attached to the pneumatic suspension, with the wings essentially fixed, the inference was made that the wings of any sailplane execute small vibrations all the time while in flight, even in calm air. By reducing the rigidity of the suspension, and thus increasing the flutter of the wings, it was found that the in-phase motion of wings does not noticeably affect the stability of the plane in a detailed analysis of data collected in test flights has proved the elastic wing suspension to enhance the aerodynamic qualities of the sailplane and to optimize its speed. The recovery of some of the energy from the turbulent air flow by this scheme is offered as a possible explanation.

Another important consequence of an elastic suspension is the reported mitigation of the sudden stress surges which usually attend a bumpy flight, and which induce fatigue in the structural components of the plane. A welcome bonus of this is the unusually smooth and comfortable ride enjoyed by the pilot even in the bumpiest of weather.

It appears that the aerodynamic, structural, and piloting advantages of an elastic wing suspension warrant further explorations in this direction.

* B. N. Sheremetyev: PLANYERY (Gliders), Moscow, 1959. Copies may be purchased from the Victor Kamin Bookstore, Inc., 2906 14th St., N.W., Washington 9, D.C. It describes 18 Soviet sailplanes, has 216 pages, 122 figures and six data tables.

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